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The unexpected ovarian malignancy found during operative laparoscopy: Incidence, management, and implications for prognosis

Ludovico Muzii, MD, Roberto Angioli, MD, Marzio Zullo, MD, and Pierluigi Benedetti Panici, MD

From the Department of Obstetrics and Gynecology, Universita Campus Bio-Medico, Rome, Italy (all authors).

The laparoscopic approach to adnexal masses has not yet reached universal acceptance. The possibility of encountering an unexpected ovarian malignancy during operative laparoscopy has been for many years a major factor against the laparoscopic approach to ovarian cysts. Intraoperative cyst rupture, which commonly occurs during laparoscopy, upstages the unexpected ovarian cancer from stage IA to stage IC, with all the consequences of possible delayed staging, necessity of adjuvant chemotherapy, and worse prognosis. Accurate preoperative selection remains the mainstay in the management of ovarian cysts. An unsuspected ovarian malignancy can be expected to be encountered in approximately 0.9% of strictly selected, benign-appearing cysts in premenopausal patients. In postmenopausal patients, this rate rises to 3.0%. In the case of cysts that appear suspect during preoperative ultrasound, the rate of unexpected malignancy rises further to 13.3%. Appropriate intraoperative management is mandatory in order not to worsen the patient's prognosis.

The laparoscopic approach to ovarian cysts has been a controversial topic for years. If, on the one hand, there is no doubt that laparoscopy represents the gold standard for the treatment of benign diseases such as ectopic pregnancy, adhesions, or minimal endometriosis, on the other hand, the time for acceptance of laparoscopy for the treatment of ovarian cysts has not yet come.

The possibility of approaching by laparoscopy an ovarian cyst that is instead an unexpected ovarian cancer represents the

nightmare of every laparoscopist. Intraoperative cyst rupture, which commonly occurs during laparoscopy, upstages the unexpected ovarian cancer from stage IA to stage IC, with all the consequences of possible delayed staging, necessity of adjuvant chemotherapy, and worse prognosis.

Data have accumulated in the last few years that shed more light on the incidence and clinical consequences of intraoperative rupture of an ovarian cyst that later on proves to be cancerous. Today, we probably know more than we did 10 years ago, when gynecologic oncologists questioned the endoscopic approach to ovarian cysts. Just as it was 10 years ago, appropriate patient selection and correct intraoperative management still represent the key points in laparoscopic approach to ovarian cysts.

Intraoperative rupture of an unexpected ovarian cancer: How often does it occur?

In 1991, a pivotal paper, which is probably one of the most-quoted papers in the gynecologic endoscopic literature, was published.¹ This paper has probably influenced to some degree every gynecologist approaching a patient with an ovarian cyst in the last decade.

The paper¹ published the results of a survey mailed to 371 gynecologic oncologists asking if, in their practice, the finding of an unexpected ovarian cancer during operative laparoscopy had ever occurred. Such an occurrence was reported for 30 patients with ovarian cancer, and for 12 patients with borderline ovarian tumors. The authors concluded that the finding of an unexpected ovarian cancer

Corresponding author: Ludovico Muzii, MD, Department of Obstetrics and Gynecology, Universita Campus Bio-Medico, Via E Longoni 38, Rome, 00155.

during laparoscopic excision of an ovarian cyst was "not uncommon," and that the 42 reported cases were "undoubtedly a gross underestimate of the magnitude of the problem." This sounded at that time, and for many years afterwards, like an obituary for laparoscopy in the management of ovarian cysts. If we go through the paper, however, many questions remain unanswered.

First of all, the real magnitude of the problem is not addressed at all. No mention is made of the time span covered by the survey. There is no mention of the total number of laparoscopies performed by the respondents for the presence of an adnexal mass. Numerators without denominators do not yield data on the incidence of this event. Second, why were cysts found lacking in benign characteristics during preoperative ultrasound approached by laparoscopy? In 45% of the patients, in fact, two or more of the following characteristics were present during preoperative sonography: size of the cyst greater than 8 cm, bilaterality, multilocularity, or "complex" appearance. This is not a problem of the laparoscopic approach per se, but rather a problem of inappropriate patient selection. Cysts that have one, two, or more of the above-mentioned sonographic characteristics can be approached by operative laparoscopy only if informed consent for a staging laparotomy is obtained preoperatively, if frozen sections are consistently used, and if an oncologic surgery team is available on-site in order to perform an immediate staging laparotomy when indicated. According to the survey's data, intraoperative frozen sections were sent in only 40% of the patients with unexpected malignancies. Immediate staging laparotomy was performed in only 17% of the patients, a delayed staging laparotomy (with a mean delay of 4.8 weeks) was performed in 71% of the patients, and a staging laparotomy was never performed in 12% of the patients.

And, last but not least, when the unexpected malignancy was encountered, in 38% of patients the procedure was aborted "with or without cyst aspiration"; in 33%, partial excision was accomplished; and in 29%, complete cyst excision was performed. There is no mention of adnexectomy. These figures are inappropriate even for carefully selected, positively benign ovarian cysts.

Therefore, in many of the cases reported in this study, an inappropriate management was followed preoperatively, intraoperatively, and postoperatively. This is obviously independent of the debate on the role of laparoscopy versus laparotomy in the management of adnexal masses. There is no clear reason to expect more problems with inappropriate management of gynecologic disease by laparoscopy than by laparotomy. Inappropriate management of ovarian cancer in particular is not specific to laparoscopy. In fact, it can occur also by laparotomy: in one study,² for example, incomplete surgical staging of early ovarian carcinoma after one or two laparotomies were performed occurred in 47% of patients. The authors concluded that either the gynecologists should be better educated in the staging of ovarian cancer or a more

efficient patient-referral policy should be considered.² In conclusion, the report¹ is invaluable because it brings to the attention of every gynecologist practicing operative laparoscopy the possibility of encountering an unexpected malignancy. The incidence of this event, however, cannot be extrapolated by the data reported.

In similar surveys published in later years in the United States,³ France^{4,5} and Austria,⁶ more detailed information was provided in this respect. Nonetheless, data from mail surveys should not be considered a reliable source of scientific evidence. Prospective case series, which will be discussed later, yield sounder information.

In 1992, a survey among members of the American Association of Gynecologic Laparoscopists³ reported an overall incidence of stage I ovarian cancers of 0.4% out of 13 739 laparoscopies performed for persistent ovarian masses. Of note is the fact that 96% of the respondents performed laparoscopy for the excision of ovarian cysts only in premenopausal women.

In the French survey,⁴ 78 cases (1.5%) of malignant ovarian cysts were reported out of 5307 ovarian lesions treated by laparoscopy. Eighteen (0.3%) were ovarian cancers, and 60 (1.1%) were borderline tumors. Similar to the report discussed earlier,¹ preoperative findings were presumed benign in only 33% of patients, and inappropriate laparoscopic procedures were performed in most patients—cyst puncture in 23% of patients, partial excision in 51%, and total removal in only 26%. Laparotomy was performed immediately in 25% of the patients and as a second-stage procedure in 58%, with a mean delay of 78 days. In 16% of the patients, a staging laparotomy was never performed.⁵

In the Austrian survey,⁶ 108 ovarian tumors (0.65%) were subsequently found to be malignant out of 16 601 laparoscopies performed for the treatment of adnexal masses. Complete data were available for 96 of such patients, 57 of which being malignant and 39 borderline tumors. During preoperative ultrasound, unilocular cysts without septations or solid parts were detected in only 20% of the patients. Immediate laparotomy was performed in only 23% of the patients. In cases of delayed laparotomy, which occurred in 56% of the cases, the mean interval between the two procedures was 88 days. In 21% of the patients, a staging laparotomy was never performed.⁶

Again, these reports highlight the inappropriateness in patient selection for laparoscopic procedures and in subsequent management once the malignancy had been diagnosed, rather than the inappropriateness of laparoscopy in treating properly selected adnexal masses.

In the surveys reported above,^{1,3-6} no explicit mention is made of cases where no evidence of malignancy is present preoperatively or intraoperatively, and the diagnosis of malignancy therefore comes later, from the final pathology report (what we would call the "totally unexpected" malignancy). In the totally unexpected cases, a delay in staging laparotomy is inevitable, despite all the possible efforts in

the appropriate selection of patients that can be managed by laparoscopy. This scenario, or, better, the different scenarios that can be outlined in the presence of the totally unexpected malignancy, will be discussed later.

Laparoscopic series on the treatment of adnexal masses

Some large series on the laparoscopic approach to adnexal masses have been published by experienced endoscopists.⁷⁻¹³ The rate of unexpected malignancies in the larger series ranges between 0.2%¹¹ and 2.5%.⁹ When narrowing the indications for operative laparoscopy to only patients with anechoic cysts without thick septations or solid parts (except for sonographic patterns highly suggestive of dermoids), the rate can be kept to the lower limit of this range,¹¹ or, in some smaller series,¹⁴ even to 0%⁷⁻²¹ (Table 1).

When, on the other hand, indications for operative laparoscopy are widened to include patients with cysts that appear sonographically complex, the rate of malignancy may rise to 11%–19%²²⁻²⁵ (Table 2).

In postmenopausal patients, even when limiting this approach to benign-appearing adnexal masses, the rate of unexpected malignancies is between 0% and 8%²⁶⁻³⁰ (Table 3). Therefore, besides clinical and sonographic findings and serum CA 125 values, the postmenopausal status is undoubtedly of paramount importance in the selection of patients for the laparoscopic approach.

In the largest series published so far,⁷ three ovarian cancers and one borderline tumor were diagnosed during laparoscopic management of 1011 women with adnexal masses, yielding a rate of 0.4%. All patients in this series were premenopausal. The rate of 0.4% appears strikingly low if we consider that, in this series, no patient was excluded preoperatively on the basis of serum CA 125 levels or ultrasonographic findings. In two patients, the malignancy was suspected during laparoscopy, whereas in the

other two patients, the diagnosis was made only at permanent sections. Serum CA 125 was normal in all three patients with cancer in whom it was measured, whereas the ultrasonographic pattern was semicystic in the three patients with ovarian cancer and cystic in the patient with borderline tumor. In four additional cases, patients underwent immediate laparotomy after laparoscopic diagnosis of suspicious lesions. Laparotomy revealed instead benign lesions, leading therefore to four false-positive diagnoses of malignancy during laparoscopy.

In another series,⁹ 757 patients with adnexal masses were approached by laparoscopy, with 7 diagnoses of ovarian cancer and 12 of borderline tumors, thus yielding a total rate of 2.5% unexpected malignancy. Ultrasonographic criteria for exclusion from laparoscopic approach in this series were suspicious features only in cysts larger than 8 cm. Serum CA 125 was measured in all patients, but it was not considered among the selection criteria. Eleven percent of the patients were postmenopausal. In this series, no use was made of frozen sections. In cases of laparoscopic suspicion of cancer, the procedure was converted to laparotomy. In 27 patients (3.6%), a false-positive laparoscopic diagnosis of malignancy was made, and an unnecessary laparotomy was performed. The specificity and the positive predictive value of the laparoscopic diagnosis of malignancy were 96.6% and 41.3%, respectively. The positive side to this approach is that in no case was a malignancy found after the initial diagnostic phase, with sensitivity and negative predictive value of the laparoscopic diagnosis of malignancy both 100%. No delayed laparotomy for an unrecognized ovarian malignancy was therefore necessary in this series.

In a more recent study,²³ the same authors reported on a series of patients with adnexal masses with suspicious features found during ultrasonography. As opposed to the previous series,⁹ in later years²³ the authors treated suspicious

Table 1 Unexpected ovarian malignancy found during operative laparoscopy for adnexal masses

Author	No. patients	No. malignancies (%)	No. carcinomas/No. borderline
Nezhat et al. ⁷	1011	4 (0.4)	3/1
Mecke et al. ⁸	678	2 (0.3)	2/0
Canis et al. ⁹	757	19 (2.5)	7/12
Neis et al. ¹⁰	807	4 (0.5)	4/0
Marana et al. ¹¹	949	2 (0.2)	1/1
Mettler et al. ¹²	493	8 (1.6)	4/4
Marana et al. ¹³	667	8 (1.2)	1/7
Van Herendaal et al. ¹⁴	121	0	0/0
Malik et al. ¹⁵	291	10 (3.4)	5/5
Buquet et al. ¹⁶	214	1 (0.5)	0/1
Sadik et al. ¹⁷	220	2 (0.9)	1/1
Rasmussen et al. ¹⁸	275	5 (1.8)	3/2
Park et al. ¹⁹	468	1 (0.2)	0/1
Lok et al. ²⁰	513	4 (0.8)	2/2
Muzii and Benedetti Panici ²¹	135	1 (0.8)	1/0
Total	7599	71 (0.9)	34 (0.4%)/37 (0.5%)

Table 2 Ovarian malignancy found during operative laparoscopy for suspicious adnexal masses

Author	No. patients	No. malignancies (%)
Childers et al. ²²	138	19 (13.8)
Canis et al. ²³	230	25 (10.9)
Dottino et al. ²⁴	160	21 (13.1)
Biran et al. ²⁵	95	15 (18.9)
Total	623	83 (13.3)

masses with adnexectomy by laparoscopy, and samples were sent for frozen section. In selected cases, in patients younger than 40 years, biopsies for frozen section were sent in order to avoid unnecessary adnexectomies. With this modified approach, the authors were able to reduce the number of unnecessary laparotomies in cases of false-positive laparoscopic diagnosis of malignancy. In this series of 230 patients with suspicious sonographic features initially managed by laparoscopy, 25 malignancies (10.9%)—10 borderline and 15 malignant tumors—were encountered. In 12 of the 15 malignant cases, immediate laparotomy was performed, whereas in 3 cases, frozen sections were negative, and the patients were treated initially by laparoscopic adnexectomy. A subsequent staging laparotomy was performed after the final pathology report 3 weeks later. In one of these three patients, the restaging procedure showed tumor diffusion of an immature teratoma that had been morcellated by laparoscopy. In conclusion, 41 unnecessary laparotomies were avoided, but this single case of iatrogenic tumor diffusion is the counterpart of a similar approach to adnexal masses that appear suspicious during ultrasound.

Frozen sections are essential, but they have limitations. In a recent series,³¹ 141 patients with ovarian cysts suspicious during laparoscopy underwent frozen section, performed either on the adnexectomy specimen or on part of the ovary (cystectomy specimen or ovarian biopsy only). Overall, the results of frozen section were accurate in 88.7% of the patients. Frozen section was correct in 95.5% of benign tumors, in 77.8% of borderline lesions, and in 75% of malignant tumors. Frozen section was more accurate for lesions smaller than 10 cm than for lesions larger than 10 cm (93% vs 74% accuracy, respectively). Also, it was more accurate in women younger than 50 years than in patients older than 50 years (92% vs 82% accuracy, respectively).

In conclusion, the pooled data from laparoscopic case series in the literature yield a rate of unexpected ovarian cancer of 0.9% for the general population of patients with ovarian cysts approached by laparoscopy (Table 1). In masses that demonstrate suspicious features during preoperative ultrasound, the rate rises to 13% (Table 2). In selected postmenopausal patients, the rate of unexpected ovarian cancer approximates 3% (Table 3).

Is intraoperative rupture of an ovarian cancer prognostically significant?

An ovarian malignancy limited to one ovary, without tumor growth on the external surface, with an intact capsule, and no ascites, that inadvertently ruptures during surgery upstages the patient from stage IA to stage IC. Whether or not this event unfavorably affects prognosis has been a matter of debate for years. In 1988, the International Federation of Gynecologists and Obstetricians included the intraoperative rupture of an ovarian carcinoma in stage IC. If older series consistently reported that surgical rupture adversely influences survival,³²⁻³⁴ more recent series with multivariate analysis reported no influence of surgical rupture on survival.³⁵⁻³⁷ In one report in particular,³⁷ in the same series of patients, surgical rupture appeared to be significantly associated with worse outcome at univariate, but not at multivariate analysis. In another study,³⁸ no difference in survival was reported for patients whose tumors had intact capsule and patients in whom rupture occurred during surgery. On the other hand, rupture occurring before surgery was associated significantly with worse prognosis.

In the most recent series,³⁹ however, the authors report that at multivariate analysis, degree of differentiation, age at diagnosis, and tumor rupture before or during surgery are associated with poor prognosis in patients with stage I invasive ovarian carcinoma. Hazard ratios were 2.65 for rupture before surgery and 1.65 for rupture during surgery. This study represents the largest published series addressing the issue of the prognostic significance of cyst rupture in stage I ovarian carcinoma. The database including 1545 patients permits sound multivariate analysis. This study, however, has some limitations. First, it is retrospective. When specifically addressing the issue of tumor rupture during surgery, reliance solely on retrospective chart review represents a major limitation and does not guarantee an unbiased assessment. Some other limitations exist in this study, such as the different treatment periods in the participating centers (1971–1982 for the Toronto database vs 1980–1998 for the Norway database), the varying lengths of follow-up (ranging somewhere between 0 and 216 months), the absence of central review of pathology, and the

Table 3 Unexpected malignancy found during operative laparoscopy for adnexal masses in postmenopausal patients

Author	No. patients	No. malignancies (%)
Canis et al. ^{9*}	92	7 (7.6)
Parker et al. ²⁶	25	0
Mann et al. ²⁷	44	0
Parker et al. ²⁸	61	0
Shalev et al. ²⁹	55	0
Hesseling et al. ³⁰	184	7 (3.8)
Total	461	14 (3.0)

*Patients older than 50 years.

different adjuvant protocols followed after surgery. Some authors⁴⁰ have argued that earlier, smaller, more homogeneous studies may even be more reliable than this series. But what we want to stress even more is that the data in the study belong to a population of patients submitted to surgery for an ovarian carcinoma by means of "standard primary surgical treatment" by laparotomy. In other words, most (if not all) of the patients were known, either preoperatively or intraoperatively, to have ovarian cancer. The conclusions obtained in this setting may not be extrapolated to a completely different population such as that of carefully selected patients with benign-appearing ovarian cysts. When the totally unexpected carcinoma is encountered during laparoscopy, it may be possible that only a minimal portion of the ovarian cyst demonstrates histological features of malignancy. In a recent series,¹³ in three of the seven borderline tumors unexpectedly encountered, the borderline features were present only in isolated foci of the cyst epithelium. In the single case of invasive carcinoma in the same series, the pathologist could diagnose only a microfocus of a G1 endometrioid carcinoma inside an endometrioma cyst wall. These patients probably represent a different subset of patients with ovarian carcinoma when compared with patients with more overt ovarian cancer treated by primary laparotomy, as those included in the database.³⁹ Even if we can anticipate optimistically better prognosis for these "microfocal" tumors, this paper³⁹ should nonetheless stimulate surgeons to avoid cyst rupture in any case.

Cyst rupture is a common event during laparoscopy. The paper³⁹ definitely does not contraindicate the laparoscopic approach to adnexal masses. In fact, cyst rupture should not be considered specific to laparoscopy. Even at laparotomy, very capable surgeons may not be able to avoid cyst rupture because of adhesions or tumor size. Also, when approaching an adnexal mass that does not have any sign of malignancy during the first diagnostic phase (as it always should be for stage IA tumors), the surgeon not practicing operative laparoscopy may choose for cyst excision a small transverse laparotomy incision, which may in turn determine inadequate exposure, and even higher rupture rates than by laparoscopy. In the only randomized study published so far,⁴¹ similar rupture rates for laparoscopy (27%) and laparotomy (30%) were reported. Nonrandomized studies reported higher rupture rates for laparoscopy as opposed to laparotomy.^{42,43} Retrospective series, however, may yield unreliable results, since in the laparotomy arm used as control minor attention could have been exerted on the issue of intraoperative rupture.

What to do during laparoscopy? How to avoid rupture?

As mentioned earlier, preoperative patient selection is the key point for the laparoscopic approach to ovarian cysts.

The age of the patient, the menopausal status, clinical findings, serum CA 125 levels, and transvaginal ultrasonography findings all represent pivotal parameters that should be considered. A thorough discussion on this issue goes beyond the aim of this paper, which will focus, in this section, on laparoscopy. As to transvaginal ultrasonography, we want only to highlight the data recently reported⁴⁴ that could serve as a practical hint in preoperative counseling. The authors report on the comparison between ultrasonography and histopathology diagnoses in a series of over 1300 women. In unilocular cysts, when ultrasonography described the cyst as echo-free, without solid parts or papillary formations, the rate of borderline or malignant tumors was 0.73% (3 out of 413) in premenopausal patients and 1.6% (4 of 247) in postmenopausal patients. When the unilocular cyst was described as having echogenic cyst content, with solid parts or papillary formations, the rate of borderline or malignant tumors was 2.1% (11 of 514) in premenopausal patients and 10.0% (13 of 130) in postmenopausal patients. These figures, derived from a large, recent series with transvaginal ultrasonography, together with the summary data reported here in Tables 1, 2 and 3, may be helpful when discussing with the patient the indication for surgery and the different surgical options available. These data also may be included in the informed consent form for reference.

As to laparoscopy, we want to stress the concept that, when approaching an adnexal mass, the diagnostic phase and the operative phase should be considered two different steps of the laparoscopic procedure, with no overlaps between the two.

The diagnostic phase includes washing for cytologic examination and thorough inspection of all pelvic organs, peritoneal surfaces, upper abdomen, diaphragm, and liver, in order to rule out macroscopic evidence of malignancy. The collected fluid may be set aside in case malignancy is found at subsequent steps, or, preferably, may be sent for cytologic examination in every case.

If an unexpected malignancy is suspected during the diagnostic phase, no operative attempt should be performed without specific oncologic training. Washing and biopsies can be performed only if the cyst capsule is not violated. With this approach, we can be sure that the prognosis for the patient remains unchanged. Prompt referral is the next step. Computed tomography scans and review of pathology slides can be performed before referral. Only with specific oncologic training, and if informed consent has been discussed and signed, may further operative steps be attempted. Laparotomy with surgical staging should be the recommended approach. Conservative management or laparoscopic surgery for ovarian carcinoma still should be considered investigational and should be confined to gynecologic oncology referral centers.

If the diagnostic step does not yield suspicious findings, operative laparoscopy can be started. The aim should be the completion of the planned procedure, either complete cyst-

tectomy or adnexectomy. Cyst aspiration and partial excision, although frequently reported, are unacceptable. Endoscopic collection bags should be used in every situation, in order to protect the abdominal wall from cell or tissue fragment seeding. The only exception to this is when the excised cystic wall is so thin that it can be retrieved without any friction nor direct contact with the abdominal wall through the trocar sleeve in place.

Adnexectomy, without any intraperitoneal cyst rupture, should be the preferred technique in postmenopausal patients. Adnexectomy also should be considered in selected premenopausal patients when preoperative ultrasonography shows inner wall irregularities or thick septations. In postmenopausal patients, monolateral adnexectomy, bilateral adnexectomy, and total abdominal hysterectomy with bilateral salpingo-oophorectomy all may be appropriate and should be discussed preoperatively with the patient. Every effort should be made not to rupture the cyst during adnexectomy. In the absence of adhesions, the removal of the adnexa without cyst rupture is usually a relatively easy goal to achieve. The procedure may be nonetheless complicated when adhesions fixing the ovary to the pelvic wall or the bowel are present. In these cases, cyst rupture can occur despite every effort. The removed adnexa should be placed in the endobag and then retrieved toward the abdominal wall. Intentional cyst rupture may be performed inside the endobag without intraperitoneal spillage, to facilitate removal from the abdominal cavity. It may be helpful, for larger cysts or when solid parts are present, to enlarge the incision around the trocar sleeve to facilitate extraction of the specimen without rupture of the endobag. Excessive traction on the endobag should never be applied, since rupture of the bag in this phase may lead to intraperitoneal and abdominal wall contamination. In addition, tissue fragments may remain trapped in the abdominal wall layers. Biopsies for frozen sections can be collected when the specimen is already outside the abdominal cavity, on the surgical stand, and sent to the pathologist. Particular attention should be paid to the internal cyst wall for the possible presence of vegetations. When these are present, and if an oncologic team is present on site, frozen section results must be awaited before awakening the patient.

In patients of reproductive age, ovarian cystectomy, as opposed to adnexectomy or ovariectomy, may be preferred. Cystectomy obviously carries a higher risk of intraoperative rupture. In cases of unilocular, echo-free cysts (which, as discussed earlier, carry the lowest risk of malignancy), intentional rupture may be performed as a diagnostic step in order to visualize possible intracystic vegetations undetected by preoperative transvaginal ultrasonography. Usually, the vegetations that go undetected during preoperative ultrasonography are rather small (less than 2–3 mm). In larger cysts, however, where the upper portion of the cyst during ultrasonography may be far from the endovaginal probe, even larger vegetations may go undetected by ultrasound.

These intracystic vegetations should be sent for frozen section.

Endometriomas rupture in almost 100% of cases due to their dense adhesion to the posterior leaf of the broad ligament. Excision of an intact endometrioma is therefore an exceedingly rare event. In cases of dermoids, the surgeon should try not to rupture the cyst, both for the risk of subsequent chemical peritonitis and for the possibility of an incorrect ultrasonographic diagnosis in the presence of solid parts. When the dermoid is small, intact cyst removal can be performed, since the cyst capsule is relatively thick, and the cleavage plane is easy to find and develop. Sometimes, rather than grasping the cyst wall with forceps, which carries a high risk of rupture, simple forced irrigation without grasping the cyst wall may help in developing the cleavage plane without rupture. The forceps grasp only the flap of ovarian cortex that has been developed, and the blunt irrigation probe develops the correct plane. If the grasping forceps pull the ovary upwards, sometimes the weight of the cyst itself may help in the development of the plane by gravity. In case of larger dermoids, the cyst wall may be thinner, and the cyst may rupture during the stripping procedure despite all efforts. In this case, thorough irrigation is mandatory in order to reduce the risk of postoperative fever, chemical peritonitis, and adhesion formation. If the adnexum is fully mobile, sometimes it is possible to fit the ovary in the endobag, and then develop the cleavage plane while the ovary is inside the bag, in order to minimize spillage in case of rupture. In case of paraovarian cysts, when cystectomy is planned, the plane of cleavage should be developed with the intact cyst. Cyst rupture and collapse, in fact, may render the plane less evident. Attention should be paid to intracystic vegetation also inside paraovarian cysts, since malignant cysts have been reported in 2% of paraovarian cysts, always associated with endocystic papillae.⁴⁵

The various strategies (adnexectomy, cystectomy of an intact cyst, and intentional rupture of the cyst) should be decided on the basis of preoperative and intraoperative findings.

Three different scenarios for the unexpected malignancy

Three different scenarios can therefore be delineated when an unexpected malignancy is encountered during laparoscopy. The three situations are completely different from one another, with different implications for prognosis. When discussing the so-called unexpected malignancy, they should not be considered collectively under the same definition.

In the first scenario, the malignancy is macroscopically evident during the first diagnostic phase, and no operative

maneuver is performed on the ovarian cyst. An immediate laparotomy should be the recommended approach, with no demonstrated adverse effect on prognosis (conservative or laparoscopic surgery should be discussed with the gynecologic oncologist). The only possible detrimental effect on prognosis could be attributed to the intraperitoneal positive pressure and the carbon dioxide environment. Too few, and sometimes even inconsistent, experimental data have been reported⁴⁶⁻⁴⁸ to draw firm conclusions on this issue at the present time. We could therefore consider this as a "safe" scenario.

In the second scenario, the malignancy is macroscopically recognized during operative laparoscopy for ovarian cystectomy or at frozen section during surgery. The cyst therefore has already ruptured, and the patient is upstaged to stage IC. Immediate laparotomy should be the recommended approach. This scenario, as recently reported,³⁹ may have significant impact on prognosis, even when immediate laparotomy is performed. However, the data from the literature do not consistently report such an adverse effect on prognosis, and also the study's data have many limitations, as discussed earlier. This second scenario should therefore be considered "possibly unsafe."

In the third scenario, no visual evidence of malignancy is present, neither during the diagnostic phase nor in any step of the operative phase. Even frozen section, when performed, may come back negative, and the procedure is completed by laparoscopy. However, the final pathology report comes back positive for malignancy. In this case, a delay in staging laparotomy is inevitable. Every effort should be made to reduce this delay to a minimum. One study⁴⁹ recently reported that when restaging patients with laparoscopically removed ovarian cysts later found to be malignant, the odds ratio of finding a stage IIB-IV disease were higher (5.3 for borderline tumors and 9.2 for carcinomas) if the staging laparotomy was performed more than 16 days after laparoscopy (mean delay: 48 days) compared with immediate staging laparotomy. No differences were present when comparing immediate laparotomy with a laparotomy performed between day 1 and day 16 after laparoscopy (mean delay: 10 days). We want to stress that these data from this study⁴⁹ are from the follow-up of the same patients of the Austrian survey,⁶ and may therefore be flawed by inappropriate patient selection and surgical management. The 16-day threshold described in the Austrian study seems a reasonable goal to achieve, and it may even seem too long a delay to most of us. Surprisingly, however, this goal seems an exception rather than the rule if we look at the data from the literature: the mean delay between laparoscopy and staging laparotomy in the above-mentioned surveys ranges between 33¹ and 88⁶ days. We would not consider 16 days' delay a safe situation, and every effort should be made to keep this delay as short as possible. In conclusion, this third scenario should be considered "unsafe." This may not be true only in cases in which the cyst

or the adnexum has been removed intact through an endobag, and spillage has therefore not occurred inside the peritoneal cavity. In that case, a delay in subsequent staging laparotomy is again inevitable, but there is much less concern (if any) that the endoscopic approach has influenced the prognosis of the patient.

For all that has been said so far, every cyst should be treated by laparoscopy as if malignant, unless proved otherwise. Washing, careful inspection, use of endobag, appropriate techniques to avoid spillage, wide indications to adnexectomy in selected patients, copious irrigation, frozen sections, and even frequent postoperative calls to the pathologist all may help to loosen the linkage between operative laparoscopy and worse prognosis in cases of unexpected, or unrecognized, ovarian cancer. In addition, accurate preoperative evaluation still remains the most important factor to be considered.

Conclusions

Operative laparoscopy should be considered the gold standard for the treatment of several benign gynecologic conditions. It has been demonstrated that laparoscopy is associated with lower postoperative pain, shorter hospital stay, and more rapid return to normal activity when compared with laparotomy.^{50,51} In cases of ovarian cysts, however, the possibility of encountering an unsuspected ovarian malignancy at the time of surgery constitutes a major concern. If ovarian malignancy is encountered at the time of initial diagnostic laparoscopy, an immediate staging laparotomy should be the recommended approach, without any detrimental effect on the patient's prognosis. If, however, the ovarian malignancy is recognized during laparoscopic surgery when the cyst has already ruptured and its contents spilled, some concern has been raised as to the possible adverse prognostic effect of the intraoperative rupture, even when appropriate surgical management is immediately started under the same anesthesia.³⁹ The worst-case scenario is when the ovarian malignancy is not recognized during any step of the operative laparoscopy, and the diagnosis of ovarian malignancy is made during final pathologic examination of the specimen removed, with significant delay between intraoperative rupture and subsequent staging laparotomy. Every effort should be made to keep this delay as short as possible.

A key factor in order to reduce the possibility of encountering an unexpected malignancy when approaching an ovarian cyst by laparoscopy is the appropriate preoperative selection of patient candidates for the endoscopic approach. Selection criteria should include history, physical examination, serum CA 125, and transvaginal ultrasonography, which all should be evaluated on the basis of the menopausal status of the patient. Few series of ovarian cysts managed by laparoscopy have been published in the litera-

ture, with rates of unexpected malignancy ranging between 0% and 19%, depending mostly on the selection criteria used. Strict selection criteria in premenopausal patients should yield rates for the unexpected ovarian malignancy of 1% or less. If oncologic facilities are available on site, wider selection criteria may be applied, and informed consent for an immediate staging laparotomy must be obtained preoperatively.

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CME 012

The Unexpected Ovarian Malignancy Found During Operative Laparoscopy: Incidence, Management, and Implications for Prognosis (Test valid through August 2005)

1. Approximately how many "unexpected" ovarian malignancies can be expected to be encountered when approaching simple cysts in patients of reproductive age?
 - a) 0.5%–1%
 - b) 2%–5%
 - c) 6%–10%
 - d) >10%
2. Approximately how many unexpected ovarian malignancies can be expected to be encountered when approaching simple cysts in postmenopausal patients?
 - a) 0.5%–1%
 - b) 2%–5%
 - c) 6%–10%
 - d) >10%
3. Approximately how many unexpected ovarian malignancies can be expected to be encountered when approaching ovarian cysts that have a suspicious appearance during preoperative ultrasound?
 - a) 0.5%–1%
 - b) 2%–5%
 - c) 6%–10%
 - d) >10%
4. Surveys from the literature report that the laparoscopic treatment of an unexpected ovarian malignancy
 - a) is a rare event, occurring in less than 0.4% of the cases
 - b) is not an uncommon event, occurring in 0.4%–1.5% of the cases
 - c) is followed by appropriate management in most cases
 - d) is always performed by a gynecologic oncologist
5. The intraoperative rupture of an ovarian carcinoma limited to one ovary, without surface growth and with negative cytology
 - a) is not prognostically significant
 - b) upstages the tumor from stage IA to IC
 - c) should be followed by multiple peritoneal biopsies
 - d) should be followed by removal of the ovary or of the cyst with an endobag
6. According to the best available evidence, intraoperative rupture of an ovarian carcinoma limited to one ovary, without surface growth and with negative cytology
 - a) is always prognostically significant
 - b) is not prognostically significant if followed by immediate staging laparotomy
 - c) is prognostically significant if more than 16 days elapse between first surgery and subsequent staging laparotomy
 - d) is not prognostically significant if managed by a gynecologic oncologist
7. Specimen collection bags should be used
 - a) when excising a dermoid cyst
 - b) when excising a cyst that shows suspect features during preoperative and/or intraoperative evaluation
 - c) when excising a paraovarian cyst
 - d) all of the above
8. For a postmenopausal patient with an ovarian cyst not suspected to be malignant during preoperative or intraoperative evaluation, the approach should be:
 - a) monolateral adnexectomy
 - b) bilateral adnexectomy
 - c) hysterectomy with bilateral salpingo-oophorectomy
 - d) all of the above may be acceptable, after preoperative discussion with the patient
9. Intentional rupture of the cyst for the visualization of the inner cyst surface can be considered relatively safe
 - a) always
 - b) in reproductive age patients
 - c) in reproductive age patients in cases of a simple cyst
 - d) never
10. Which one of the following scenarios for the unexpected ovarian malignancy can be considered the safest?
 - a) diagnostic laparoscopy followed by immediate staging laparotomy
 - b) diagnostic laparoscopy with ovarian biopsies followed by prompt referral to a gynecologic oncologist
 - c) operative laparoscopy with maximal care to avoid intraperitoneal spilling of the cyst content and subsequent treatment tailored on the basis of final pathology
 - d) laparoscopic staging of the ovarian carcinoma

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The Unexpected Ovarian Malignancy Found During Operative Laparoscopy: Incidence, Management, and Implications for Prognosis

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